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EXAMINER	
COUGHLAN, PETER D	

ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/779,717	TORII ET AL.	
	Examiner	Art Unit	
	Peter Coughlan	2129	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 July 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/19/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Detailed Action

1. This office action is in response to an AMENDMENT entered July 13, 2006 for the patent application 10/779717 filed on February 18, 2004.

2. The First Office Action of April 13, 2006 is fully incorporated into this Final Office Action by reference.

3. One recommendation for possible allowance is the following. The claims of the application were written too broad and left the Examiner a lot of room for interpretation. It seems to the Examiner that the real invention is illustrated in figures 1 and 2 of Patent Publication 20040162644. If the claims were narrowed where there are two joined neural networks with weight adjustment being accomplished by a genetic algorithm, with 6 input variables from 'steering angle' to 'vehicle acceleration' and 4 outputs resulted from 'yaw rate' to 'pitch', and these amendments are in the body of the claims and not in the preamble, this would clarify the invention as per figures 1 and 2. This invention might exist for F1 racers or fighter jet braking systems, but it would narrow the domain which the Examiner could use. These modifications should be in the independent claims.

Status of Claims

4. Claims 1-19 are pending.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 13 is rejected under 35 U.S.C. 102(b) (hereinafter referred to as **Kamihira**) being anticipated by Kamihira et al., U.S. Patent Publication 20020045958.

Claim 13.

Kamihira teaches determining an optimum solution of a genetic type based on a learning rule using a hereditary algorithm while setting said coupling weight coefficient in said first recurrent neural network as said genetic type (**Kamihira,** ¶0053, ¶0046, ¶0040 and ¶0074, ; 'Determining an optimum solution' of applicant is equivalent to 'optimum control 'of Kamihira.); and outputting an optimum solution of said coupling weight coefficient to said first recurrent neural network based on said optimum solution of said genetic type, wherein (**Kamihira,** ¶0046, ¶0053, ¶0071; 'Genetic type' of applicant is equivalent to 'evolution type' of Kamihira.) said first recurrent neural network

outputs a parameter indicating said motion state of the vehicle based on predetermined input information, thereby functioning as said vehicle motion model. (**Kamihira,** ¶0038, Fig 8; 'Vehicle motion' of applicant is equivalent to 'controlling a vehicle engine' of Kamihira. 'Outputs a parameter' of applicant is equivalent to the output of step 3.)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 3, 5, 7, 9, 11, 12, 14, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamihira as set forth above in view of Mehrotra ('Elements of Artificial Neural Networks', referred to as **Mehrotra**)

Claims 1, 11 and 12.

Kamihira fails to particularly call for a first recurrent neural network formed by connecting plural nodes so that an output of a node is input to another node in

accordance with a predetermined coupling weight coefficient, comprising a loop feeding back an output of at least one node to at least one of said one node and a node other than said one node.

Mehrotra teaches a first recurrent neural network formed by connecting plural nodes so that an output of a node is input to another node in accordance with a predetermined coupling weight coefficient, comprising a loop feeding back an output of at least one node to at least one of said one node and a node other than said one node. (**Mehrotra,** p137, Figure 4.24; Mehrotra illustrates a total of five nodes, each with a feedback path to the other nodes and to itself.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kamihira by giving the neural network feed back pathways as taught by Mehrotra to have a first recurrent neural network formed by connecting plural nodes so that an output of a node is input to another node in accordance with a predetermined coupling weight coefficient, comprising a loop feeding back an output of at least one node to at least one of said one node and a node other than said one node.

For the purpose of giving the neural network a way to train itself using loop feeding back pathways

Kamihira teaches an optimizing unit for determining an optimum solution of said coupling weight coefficient in said first recurrent neural network based on a learning rule using a hereditary algorithm (**Kamihira,** ¶0053, ¶0046 and ¶0074, 'Determining an optimum solution' of applicant is equivalent to 'produce the optimum characteristic' of Kamihira.),, wherein said first recurrent neural network outputs a first parameter

indicating said motion state of the vehicle based on predetermined input information, thereby functioning as said vehicle motion model. (**Kamihira,** ¶0053, ¶0038; 'Vehicle motion' of applicant is equivalent to 'controlling a vehicle engine' of Kamihira.)

Claim 2.

Kamihira fails to particularly call for said first recurrent neural network has a hierarchical structure comprising at least an input layer formed of one or more nodes and an output layer formed of one or more nodes.

Mehrotra teaches said first recurrent neural network has a hierarchical structure comprising at least an input layer formed of one or more nodes and an output layer formed of one or more nodes. (**Mehrotra,** p137, Figure 4.24; The multilayered design indicates a hierarchical structure.), It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kamihira by having at least one input node and one output node as taught by Mehrotra to have the said first recurrent neural network has a hierarchical structure comprising at least an input layer formed of one or more nodes and an output layer formed of one or more nodes.

For the purpose of establishing an input and output location for the neural network.

Kamihira teaches said optimizing unit determines said optimum solution of said coupling weight coefficient with connection of respective nodes between neighboring

layers being set as a processing target. (**Kamihira,** ¶0041; "Optimum solution' of applicant is equivalent to 'customizes control parameters' of Kamihira.)

Claim 3.

Kamihira fails to particularly call for said first recurrent neural network is formed of said plural nodes connected mutually so that said output of said one node is input to all the plural nodes including said one node, and respective outputs of said plural nodes are input to said one node, and said optimizing unit.

Mehrotra teaches said first recurrent neural network is formed of said plural nodes connected mutually so that said output of said one node is input to all the plural nodes including said one node, and respective outputs of said plural nodes are input to said one node, and said optimizing unit. (**Mehrotra,** p137, Figure 4.24; Mehrotra illustrates that each node is connected to every other node and to itself.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kamihira by defining the architecture of a recurrent neural network as taught by Mehrotra to have a first recurrent neural network is formed of said plural nodes connected mutually so that said output of said one node is input to all the plural nodes including said one node, and respective outputs of said plural nodes are input to said one node, and said optimizing unit.

For the purpose of taking advantage of a recurrent neural network properties Kamihira teaches determines said optimum solution of said coupling weight coefficient with mutual connection of said plural nodes being set as a processing target.

(**Kamihira,** ¶0040 and ¶0041; 'Optimum solution' and 'coupling weight coefficient' of applicant is equivalent to 'optimum control' and 'control parameters' of Kamihira.)

Claims 5, 7 and 9.

Kamihira fails to particularly call for a second recurrent neural network constructed as a network different from said first recurrent neural network.

Mehrotra teaches a second recurrent neural network constructed as a network different from said first recurrent neural network. (**Mehrotra,** p137, Figure 4.23(b); Mehrotra illustrates a recurrent neural network with three outputs.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kamihira by utilizing a different design of a recurrent neural network as taught by Mehrotra to have a second recurrent neural network constructed as a network different from said first recurrent neural network.

For the purpose of fulfilling a different function than that of the first recurrent neural network.

Kamihira teaches functioning as the vehicle motion model by outputting a second parameter indicating a motion state of the vehicle different from said first parameter (**Kamihira,** ¶0040; Kamihira illustrates two outputs, 'fuel injector' and 'throttle value'.), wherein said optimizing unit further determines the optimum solution of said coupling weight coefficient in said second neural network based on said learning rule using said hereditary algorithm. (**Kamihira,** ¶0053 and ¶0074)

Claim 14.

Kamihira fails to teach one or more nodes and an output layer formed of one or more nodes.

Mehrotra teaches one or more nodes and an output layer formed of one or more nodes. (**Mehrotra,** p137) It would have been obvious to a person having ordinary skill

in the art at the time of applicant's invention to modify the teachings of Kamihira by having nodes for the input and output layers as taught by Mehrotra to have one or more nodes and an output layer formed of one or more nodes.

For the purpose of having access to an input and output locations for using the invention.

Kamihira teaches wherein said determining said optimum solution of said genetic type comprises determining said optimum solution of said genetic type (**Kamihira,** ¶0041; "Optimum solution' of applicant is equivalent to 'customizes control parameters' of Kamihira.)

Kamihira fails to teach while connection of respective nodes between neighboring layers is set as a processing target.

Mehrotra teaches while connection of respective nodes between neighboring layers is set as a processing target. (**Mehrotra,** p137) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kamihira by employing standard interconnections between nodes for a neural network as taught by Mehrotra to have connection of respective nodes between neighboring layers is set as a processing target.

For the purpose of using the neural network to it's full potential.

Claim 15.

Kamihira fails to teach wherein said first recurrent neural network is formed of said plural nodes connected mutually so that said output of said one node is input to all other nodes including said one node, and respective outputs of said plural nodes are input to said one node and wherein said determining said optimum solution of said coupling weight coefficient comprises determining said optimum solution of said coupling weight coefficient while mutual connection of respective nodes is set as a processing target

Mehrotra teaches wherein said first recurrent neural network is formed of said plural nodes connected mutually so that said output of said one node is input to all other nodes including said one node, and respective outputs of said plural nodes are input to said one node (**Mehrotra,** p137, Figure 4.24; Mehrotra illustrates that each node is connected to every other node and to itself.)and wherein said determining said optimum solution of said coupling weight coefficient comprises determining said optimum solution of said coupling weight coefficient while mutual connection of respective nodes is set as a processing target. (**Mehrotra,** p138, Fig 4.25; 'Optimum solution' is accomplished by 'supervised training algorithm for recurrent networks' of Mehrotra.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kamihira by describing the basic configuration of neural networks as taught by Mehrotra to havw said first recurrent neural network is formed of said plural nodes connected mutually so that said output of said one node is input to all other nodes including said one node, and respective outputs of said plural nodes are input to said one node and wherein said determining said optimum solution of said

coupling weight coefficient comprises determining said optimum solution of said coupling weight coefficient while mutual connection of respective nodes is set as a processing target

For the purpose of a better understanding of the method and see where the modified weights are employed for convergence.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 4, 6, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamihira as set forth above in view of Fujita (U. S. Patent Publication 20020158599, referred to as **Fujita**)

Kamihira does not teach each of said plural nodes uses one of a sigmoid function and a non-sigmoid function other than said sigmoid function as a transfer function.

Fujita teaches each of said plural nodes uses one of a sigmoid function and a non-sigmoid function other than said sigmoid function as a transfer function. (**Fujita,** ¶0332; 'Non-sigmoid function' of applicant is equivalent to 'threshold function' of Fujita.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kamihira by using both sigmoid and non-sigmoid functions as taught by Fujita to have each of said plural nodes uses one of a sigmoid function and a non-sigmoid function other than said sigmoid function as a transfer function.

For the purpose of using both types of functions better enables the model to replicate the vehicle motion model.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 16, 17, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamihira as set forth above in view of Kimoto (U. S. Patent 5579442, referred to as **Kimoto**)

Claims 16, 17, 18

Kamihira does not teach wherein a second recurrent neural network is constructed as a network different from said first recurrent neural network, and functions as the vehicle motion by outputting a second parameter indicating a motion state of the vehicle different from said first parameter.

Kimoto teaches wherein a second recurrent neural network is constructed as a network different from said first recurrent neural network, and functions as the vehicle motion by outputting a second parameter indicating a motion state of the vehicle different from said first parameter.(**Kimoto,** Figures 14 and 15; Kimoto illustrates two neural networks joined together where the topography of the first does not match the topography of the second.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kamihira by illustrating that neural networks can have different designs as taught by Kimotmo to have a second recurrent neural network is constructed as a network different from said first recurrent neural network, and functions as the vehicle motion by outputting a second parameter indicating a motion state of the vehicle different from said first parameter.

For the purpose of implementing different designs for different input parameters and different solutions sought.

Kamihira teaches said method further comprising, determining the optimum solution of the genetic type while setting the coupling weight coefficient in said second recurrent neural network as said genetic type, and outputting said optimum solution of said coupling weight coefficient to said second recurrent neural network based on said optimum solution of said genetic type. (**Kamihira,** ¶0049 and ¶0041; "Determining the optimum solution' of applicant is equivalent to 'optimal process' of Kamihira.)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kamihira and Kimoto as set forth above in view of Minowa (U. S. Patent 6397140, referred to as **Minowa**)

Claim 19

Kamihira does not teach said first recurrent neural network and said second recurrent neural network are mutually connected to each other so that a state variable including a correlation with said first parameter output from said first recurrent neural network is input to said second neural network.

Kimoto teaches said first recurrent neural network and said second recurrent neural network are mutually connected to each other so that a state variable including a correlation with said first parameter output from said first recurrent neural network is input to said second neural network (**Kimoto,** C16:26-38; The 'state variable' of applicant would be the 'orientation' of Kimoto.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kamihira by connecting a first neural network to a second neural network as taught by Kimoto to have a first recurrent neural network and said second recurrent neural network are mutually connected to each other so that a state variable including a correlation with said first parameter output from said first recurrent neural network is input to said second neural network.

For the purpose of taking advantage of a neural network parallel processing ability for faster inputs to a second neural network.

Kamihira and Kimoto do not teach the state variable represents one of a road surface state and a motion state of the vehicle.

Minowa teaches state variable represents one of a road surface state and a motion state of the vehicle. (**Minowa,** C2:20-35 and C11:22-53) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kamihira and Kimoto by using a neural network for determining the coefficient of friction of the road surface as taught by Minowa to have the state variable represents one of a road surface state and a motion state of the vehicle.

For the purpose of using this information for a portion of a vehicle computer assist program.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Patentability shall not be negatived by the manner in which the invention was made.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kamihira and Mehrotra as set forth above in view of Kimoto (U. S. Patent 5579442, referred to as **Kimoto**) and Minowa (U. S. Patent 6397140, referred to as **Minowa**)

Claim 10

Kamihira and Mehrotra do not teach said first recurrent neural network and said second recurrent neural network are mutually connected to each other so that a state variable including a correlation with said first parameter output from said first recurrent neural network is input to said second neural network, where said state variable represents one of a road surface state and a motion state of the vehicle.

Kimoto and Minowa teach said first recurrent neural network and said second recurrent neural network are mutually connected to each other so that a state variable including a correlation with said first parameter output from said first recurrent neural network is input to said second neural network (**Kimoto,** C16:26-38; The 'state variable' of applicant would be the 'orientation' of Kimoto.), where said state variable represents one of a road surface state and a motion state of the vehicle. (**Minowa,** C2:20-35 and C11:22-53) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kamihira and Mehrotra by using neural networks to determine the coefficient of friction of a road

surface as taught by Kimoto and Minowa to have first recurrent neural network and said second recurrent neural network are mutually connected to each other so that a state variable including a correlation with said first parameter output from said first recurrent neural network is input to said second neural network, where said state variable represents one of a road surface state and a motion state of the vehicle.

For the purpose of using this information for a portion of a vehicle computer assist program.

Response to Arguments

6. Applicant's arguments filed on July 13, 2006 for claims 1-19 have been fully considered but are not persuasive.

7. In reference to the Applicant's argument:

Claims 1-19 are presently pending in this application. Claims 1-3 and 10-19 have been amended to more particularly define the claimed invention.

It is noted that the amendments are made only to more particularly define the invention and not for distinguishing the invention over the prior art, for narrowing the scope of the claims, or for any reason related to a statutory requirement for patentability. It is further noted that, notwithstanding any claim amendments made herein, Applicant's intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

Claims 1-19 are rejected under 35 U.S.C. § 101 for nonstatutory subject matter. Applicant respectfully traverses this rejection.

Examiner alleges Applicant's invention is ineligible because it is for a vehicle motion model. However, Applicant contends that the "vehicle motion model generating device... outputting...a parameter indicating said motion state of the vehicle," is a useful, concrete and tangible result. The focus must be on the result of the claim as a whole, not the individual steps or structure used to produce the result. This useful, concrete and tangible result is specifically recited in each of the independent claims.

A usefulness of this result, the parameter indicating a motion state of the vehicle, may include enhancing the operational stability of vehicles by estimating the operational stability of a vehicle by analyzing the behavior of the vehicle in a motion state or a vehicle motion state based on an approximating vehicle motion model. (Specification at page 1, lines 13-25.)
The claimed invention additionally produces a concrete result in that the parameter indicating said motion state of the vehicle may be reproducible since it is an approximation based on the actual motion state of the vehicle. Here, the data processed is not subjective but is the actual motion state of the vehicle and the data generated from the calculations used in conjunction with the data of the actual motion state of the vehicle.

Finally, the parameter indicating said motion state of the vehicle fails to fall into any 35 U.S.C. § 101 judicial exception as merely an abstract idea or mathematical algorithm. The vehicle motion model generating device outputs a parameter indicating said motion state of the vehicle, that is used to enhance the operational stability of vehicles having vehicle stabilization systems.

Applicant respectfully requests the Examiner to reconsider and withdraw this rejection.

Examiner's response:

The applicant is correct in stating that the parameter indicating a motion state of a vehicle can be used for stability is stated in the specification. This is not stated in the claims and the claims define the invention and not the specification. Limitations cited in the specification and not recited in the claims are not read into the claims (see ¶14. below)

8. In reference to the Applicant's argument:

Claims 13-19 are rejected under 35 U.S.C. §112, first paragraph. Applicant respectfully traverses this rejection.

The Examiner alleges, "there is no mention on the connections between the recurrent neural network and the genetic algorithms and what process happens at what location during time 'T'."

The Examiner is clearly incorrect. Indeed, Applicant directs the Examiner to the following exemplary passages in Applicant's specification, inter alia, which clearly enables these claims:

The optimizing unit 10 carries out an operation based on a learning rule using a genetic algorithm, and outputs predetermined parameters as an operation result to the vehicle motion model unit 20. As described later, these parameters correspond to a coupling weight coefficient Kij of a recurrent neural network and a threshold value 8j, since each of estimating modules 21 to 24 constituting the vehicle motion model unit 20 is constructed by the recurrent neural network. Here, "the recurrent neural network" means a neural network having a feedback loop. (Specification at page 11, lines 6-16.)

Fig. 3 is a flowchart showing the procedure of determining the optimum solution of the weight coefficient wij and the threshold value 8j by using the genetic algorithm. The processes shown in Fig. 3 are carried out by the optimizing unit 10. The optimizing unit 10 carries out the following processes on each of the estimation modules 21 to 24. (Specification at page 16, lines 19-24.)

Applicant respectfully requests the Examiner to reconsider and withdraw this rejection.

Examiner's response:

Examiner withdraws 35 U.S.C. §112, first paragraph rejection.

9. In reference to the Applicant's argument:

Claims 16-18 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Applicant respectfully traverses this rejection.

Claim 13 recites "a first recurrent neural network," and claim 16 recites, "a second recurrent neural network." Claim 13 and 14 recite, a/said "first recurrent neural network," and claim 17 recites, "a second recurrent neural network." Finally, claim 13 and 15 recite, a/said "first recurrent neural network," and claim 18 recites, "a second recurrent neural

network." Applicant fails to understand how the term, "a second recurrent neural network," in claims 16-18 fails to provide insufficient antecedent basis, and Applicant respectfully requests the Examiner to reconsider and withdraw this rejection.

Examiner's response:

Examiner withdraws 35 U.S.C. §112, second paragraph rejection.

10. In reference to the Applicant's argument:

Claims 13-18 stand rejected under 35 U.S.C. §102(b) as being unpatentable over Kamihira, U.S. Pat. Pub. No. 2002/0045958.

Claims 1-3, 5, 7, 9 and 11-12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kamihira, U.S. Pat. Pub. No. 2002/0045958, further in view of Mehrotra, "Elements of Artificial Neural Networks".

Claims 4, 6 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kamihara and Mehrotra, further in view of Fujita, U.S. Pat. Pub. No. 2002/0158599.

Claim 19 stands rejection under 35 U.S.C. § 103(a) as being unpatentable over Kamihara further in view of Minowa, U.S. Pat. No. 6,397,140, (Minowa) and Kimoto, U.S. Pat. No. 5,579,442, (Kimoto).

These rejections are respectfully traversed in view of the following discussion.

I. APPLICANT'S CLAIMED INVENTION

The claimed invention (as defined, for example, by independent claim 1) is directed to a vehicle motion model generating device for generating a vehicle motion model that represents a motion state of a vehicle, including, a first recurrent neural network formed by connecting plural nodes such that an output of a node is input to another node in accordance with a predetermined coupling weight coefficient, comprising a loop feeding back an output of at least one node to at least one of the one node and a node other than the one node, and an optimizing unit for determining an optimum solution of the coupling weight coefficient in the first recurrent neural network based on a learning rule using a hereditary algorithm, wherein the first recurrent neural network outputs a first parameter indicating the motion state of the vehicle based on predetermined input information, thereby functioning as the vehicle motion model.

Conventionally, in the neural network, adjustment (or learning) of the coupling weight coefficient is carried out in advance according to an algorithm such as back propagation so that the output corresponds to a teaching signal. (Specification at page 3, lines 5-8.)

Additionally, when a vehicle motion model is set, a motion equation is linearly approximated to avoid cumbersome operation processing in the solution calculating process. Therefore, the vehicle motion model may not accurately represent the motion state of the vehicle, that is, the behavior of the vehicle in a non-linear region. (Specification at page 3, lines 10-15.)

Furthermore, in a feed-forward type neural network is used, the value output from the neural network and the value input to the neural network are independent of each other. Thus, the motion state of the vehicle may not be accurately represented in such a neural network. In particular, the values output from the neural network are varied in accordance with not only the input, but also the value thereof at the present time (a present value). Consequently, it is necessary to feed back the output value and reflect the output value to the neural network, in order to estimate the motion state of the vehicle with high precision. However, the neural network having such feedback has a problem that the coupling weight coefficient cannot be learned according to the principle of a learning rule such as back propagation. Thus, accurate estimation of the road surface friction coefficient is hardly achieved. (Specification at page 3, line 16 to page 4, line 11.)

The claimed invention (e.g., as recited in claims 1 and 11-13), on the other hand, provides a novel method of creating a motion model of a vehicle by using a recurrent neural network containing a feedback loop, specifically, "a first recurrent neural network formed by connecting plural nodes such that an output of a node is input to

another node in accordance with a predetermined coupling weight coefficient, comprising [9] loop feeding back an output of at least one node to at least one of said one node and a node other than said one node." II. THE ALLEGED PRIOR ART REJECTIONS

A. 35 U.S.C. § 102(b) Rejection over Kamihira, U.S. Pat. Pub. No. 2002/0045958

The Examiner alleges that Kamihira, U.S. Pat. Pub. No. 2002/0045958, (Kamihira), teaches the invention of claims 13-19.

Applicant submits, however, that Kamihira does not teach or suggest: "a method for generating a vehicle motion model that represents a motion state of a vehicle, wherein a first recurrent neural network being formed by connecting plural nodes so that an output of a node is input to another node in accordance with a predetermined coupling weight coefficient and includes a loop feeding back an output of at least one node to at least one of said one node and a node other than said one node, said method being executed by a computer, said method comprising:

wherein said first recurrent neural network outputs a parameter indicating said motion state of the vehicle, based on predetermined input information, thereby functioning as said vehicle motion model."

First, Applicant respectfully traverses the Examiner's allegation that Applicant's vehicle motion is equivalent to controlling a vehicle engine of Kamihara, since there is no teaching or suggestion in Kamihara that controlling a vehicle engine is equivalent to a method for generating a vehicle motion model that represents a motion state of a vehicle. Kamihara states:

[0038] With reference to FIGS. 2 to 13, an apparatus for customizing overall characteristics that is applied for controlling a vehicle engine, will be described.

Further, Kamihara fails to teach or suggest and the Office Action fails to address, "a first recurrent neural network being formed by connecting plural nodes so that an output of a node is input to another node."

Further, Kamihara fails to teach or suggest and the Office Action fails to address, "a loop feeding back an output of at least one node to at least one of said one node and a node other than said one node." Kamihara teaches:

A machine 1 is manipulated by a user 6 using a control module 2 via an interface 4. Performance of the machine I is controlled essentially by the control module 2 having an input-output relationship regulated by control parameters. Initial values of the control parameters can be pre-selected, and the machine 1 is activated with the initial values. The performance of the machine 1 is evaluated by the user 6. This feedback loop (the user 6-3the interface 4-the control module 2- 'the machine 1-3the user 6) is found in conventional operation. ... This second loop (the machine 13the user 6F-the interface 5F--3the parameter module 33the control module 2~>the machine 1) allows the user 6 to customize the control module in real time. (Paragraph [0032].)

There is no teaching or suggestion in Kamihara about either feedback loop found in paragraph [0032] of feeding back an output of at least one node to at least one of said one node and a node other than said one node.

Furthermore, Kamihara fails to teach or suggest, "said first recurrent neural network outputs a parameter indicating said motion state of the vehicle based on predetermined input information, thereby functioning as said vehicle motion model." Since Kamihara fails to teach or suggest a vehicle motion model, but rather an engine control system, Kamihara fails to teach or suggest outputting a parameter indicating a motion state of the vehicle.

Examiner's response:

'Vehicle motion model' of applicant is equivalent to 'controlling characteristics of device' of Kamihira. Kamihira uses a neural network (¶0053) which implies a network of connecting of plurality of nodes. The 'Feed back loop' of applicant is equivalent to the loop in Fig. 8 which includes 'Step 8'of Kamihira. The output of the transmission (Kamihira, ¶0053) of a vehicle is directly related to the 'motion state of a vehicle' of applicant. Applicant is correct is stating that Kamihira fails to teach a network of connecting plurality of nodes. 'Recurrent neural network' is illustrated by Mehrotra. Examiner stated that Mehrotra teaches a network of connecting a plurality of nodes.

'The feedback loop' of Kimihira is combined with the details of neural networks of Mehrotra. 'Vehicle motion model' of applicant is equivalent to 'controlling characteristics of device' of Kamihira. This in combination with Mehrotra maps the applicants invention of a neural network that outputs a parameter model that is vehicle based.

11. In reference to the Applicant's argument:

B. 35 U.S.C. § 103(a) Rejection over Kamihira, U.S. Pat. Pub. No. 2002/0045958 further in view of Mehrotra, "Elements of Artificial Neural Networks"

The Examiner alleges that Kamihira, further in view of Mehrotra, "Elements of Artificial Neural Networks", (Mehrotra), teaches the invention of claims 1-3, 5, 7, 9 and 11-12.

Applicant submits, however, that Kamihira further in view of Mehrotra does not teach or suggest:

"a vehicle motion model generating device for generating a vehicle motion model that represents a motion state of a vehicle," (from Applicant's claim 1);

"a road surface friction coefficient estimating device for estimating a road surface friction coefficient based on a vehicle motion model that represents a motion state of a vehicle and is generated by a vehicle motion model generating device," (from Applicant's claim 11);

"a vehicle behavior estimating device for estimating a behavior of a vehicle based on a vehicle motion model that represents a motion state of a vehicle and is generated by a vehicle motion model generating device," (from Applicant's claim 12); and,

"wherein said first recurrent neural network outputs a first parameter indicating said motion state of the vehicle based on predetermined input information, thereby functioning as said vehicle motion model," (from Applicant's claims 1, 11 and 12).

Kamihira, as argued above, and Mehrotra fail to teach or suggest generating or estimating anything that represents a motion state of a vehicle. Controlling a vehicle engine has taught by Kamihira, is not equivalent to Applicant's:

generating a vehicle motion model;

estimating a road surface friction coefficient based on a vehicle motion model; or

estimating a behavior of the vehicle based on a vehicle motion model; that represents a motion state of a vehicle.

Furthermore, neither Kamihira nor Mehrotra teach or suggest, a 'first recurrent neural network outputs a first parameter indicating said motion state of the vehicle ... thereby functioning as said vehicle motion model. "

Therefore, Applicant respectfully requests Examiner to reconsider and withdraw this rejection since the alleged prior art reference fails to teach or suggest each and every element and feature of Applicant's claimed invention.

Examiner's response:

Mehrotra is in combination with Kamihira which states a transmission parameters which maps to a 'motion state of a vehicle'. 'Recurrent neural network' is illustrated by Mehrotra (see ¶10.). Road surface friction coefficient is mention in the preamble of the claim and not within the body of the claim. The 'estimating device' of applicant is equivalent to the 'neural network' of either Mehrotra or Kamihira. The 'generation of a motion state of a vehicle' is equivalent to Fig 8, Step 3, 'try a ride' of Kamihira. 'Outputs a first parameter' of applicant would be occurring between steps 3 and steps 4 in Fig 8 of Kamihira.

12. In reference to the Applicant's argument:

C. 35 U.S.C. § 103(a) Rejection over Kamihara and Mehrotra further in view of Fujita, U.S. Pat. Pub. No. 2002/0158599

The Examiner alleges that Kamihara and Mehrotra, (Kamihara and Mehrotra), further in view of Fujita, U.S. Pat. Pub. No. 2002/0158599, (Fujita), teaches the invention of claims 4, 6 and 8.

Applicant submits, however, that Kamihara and Mehrotra further in view of Fujita does not teach or suggest, "a vehicle motion model generating device for generating a vehicle motion model that represents a motion state of a vehicle, and wherein said first recurrent neural network outputs a first parameter indicating said motion state of the vehicle based on predetermined input information, thereby functioning as said vehicle motion model," as argued above with respect to Applicant's independent claim 1.

Therefore, Applicant respectfully requests Examiner to reconsider and withdraw this rejection since the alleged prior art reference fails to teach or suggest each and every element and feature of Applicant's claimed invention.

Examiner's response:

Fujita was used in combination of Kamihira and Mehrotra for illustrating basic components of neural networks. That being a the concept of a threshold level and the sigmoid function.

13. In reference to the Applicant's argument:

D. 35 U.S.C. § 103(a) Rejection over Kamihara further in view of Minowa, U.S. Pat. No. 6,397,140 and Kimoto, U.S. Pat. No. 5,579,442

The Examiner alleges that Kamihara further in view of Minowa, U.S. Pat. No. 6,397,140, (Minowa) and Kimoto, U.S. Pat. No. 5,579,442, (Kimoto) teaches the invention of claim 19.

Applicant submits, however, that Kamihara further in view of Minowa and Kimoto does not teach or suggest, "a method for generating a vehicle motion model that represents a motion state of a vehicle, wherein a first recurrent neural network being formed by connecting plural nodes so that an output of a node is input to another node in accordance with a predetermined coupling weight coefficient and includes a loop feeding back an output of at least one node to at least one of said one node and a node other than said one node," and "wherein said first recurrent neural network outputs a parameter indicating said motion state of the vehicle based on predetermined input information, thereby functioning as said vehicle motion model," as argued above with respect to Applicant's claim 13.

Therefore, Applicant respectfully requests Examiner to reconsider and withdraw this rejection since the alleged prior art reference fails to teach or suggest each and every element and feature of Applicant's claimed invention.

Examiner's response:

Minowa was introduced for the concept of determining 'a road surface friction coefficient'. Such invention was stated in the Office Action dated July 13, 2006.

Examination Considerations

14. The claims and only the claims form the metes and bounds of the invention. "Office personnel are to give the claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. *In re Prater*, 415 F.2d, 1393, 1404-05, 162 USPQ

541, 550-551 (CCPA 1969)" (MPEP p 2100-8, c 2, l 45-48; p 2100-9, c 1, l 1-4). The Examiner has the full latitude to interpret each claim in the broadest reasonable sense. Examiner will reference prior art using terminology familiar to one of ordinary skill in the art. Such an approach is broad in concept and can be either explicit or implicit in meaning.

15. Examiner's Notes are provided to assist the applicant to better understand the nature of the prior art, application of such prior art and, as appropriate, to further indicate other prior art that maybe applied in other office actions. Such comments are entirely consistent with the intent and sprit of compact prosecution. However, and unless otherwise stated, the Examiner's Notes are not prior art but link to prior art that one of ordinary skill in the art would find inherently appropriate.

16. Examiner's Opinion: Paragraphs 14 and 15 apply. The Examiner has full latitude to interpret each claim in the broadest reasonable sense.

Conclusion

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

18. Claims 1-19 are rejected.

Correspondence Information

19. Any inquiry concerning this information or related to the subject disclosure should be directed to the Examiner Peter Coughlan, whose telephone number is (571) 272-5990. The Examiner can be reached on Monday through Friday from 7:15 a.m. to 3:45 p.m.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor David Vincent can be reached at (571) 272-3687. Any response to this office action should be mailed to:

Commissioner of Patents and Trademarks,

Washington, D. C. 20231;

Hand delivered to:

Receptionist,

Customer Service Window,

Randolph Building,

401 Dulany Street,

Alexandria, Virginia 22313,

(located on the first floor of the south side of the Randolph Building);

or faxed to:

(571) 273-8300 (for formal communications intended for entry.)

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have any questions on access to Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

Peter Coughlan

9/18/2006

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